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SPRINKLER

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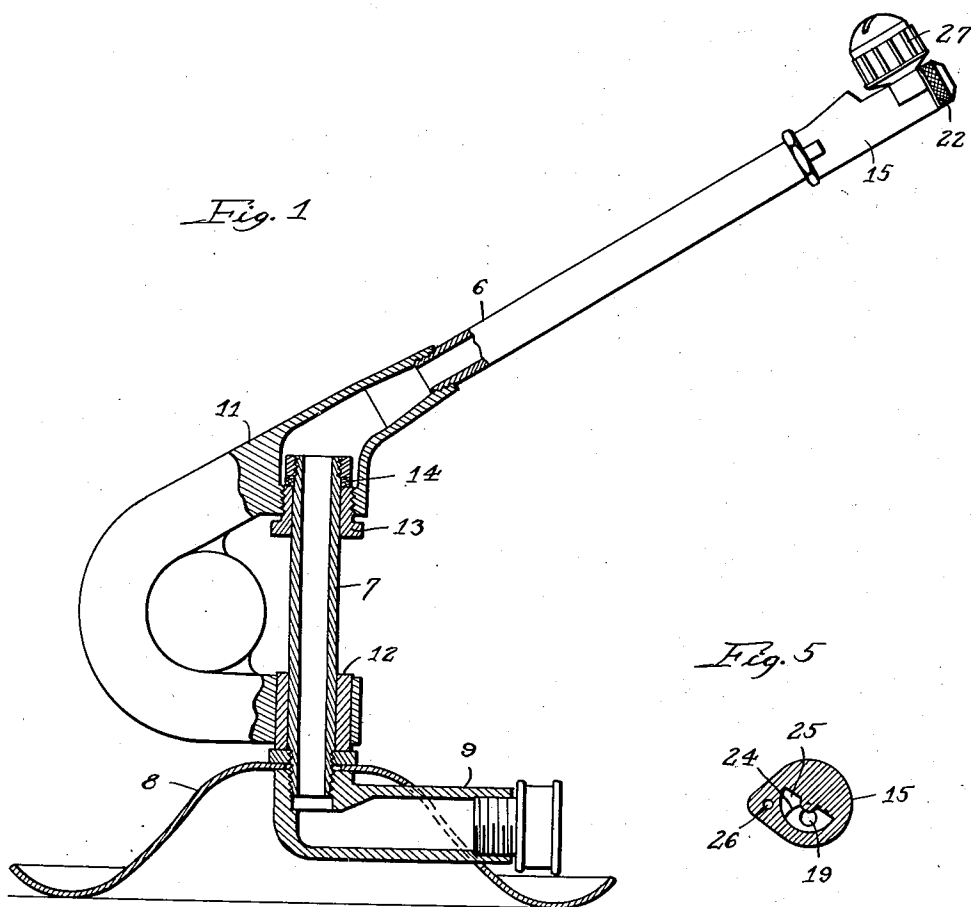
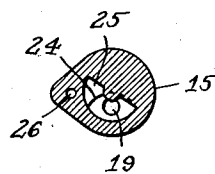
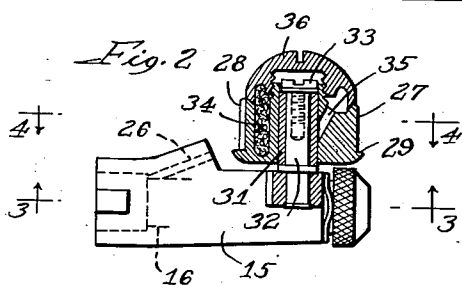
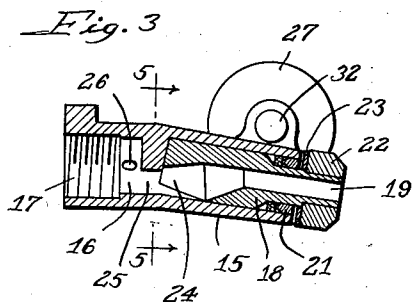
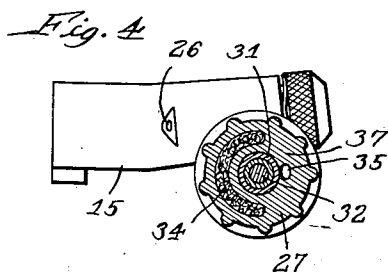


Fig. 5



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SPRINKLER

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10 Claims. (Cl. 299—69)

This invention relates to sprinklers of the reaction-sprayer type adapted for sprinkling or irrigating under widely varying conditions and requirements.

One of the objects of our invention is to provide a sprinkler of this type having improved means for vibrating the rotating fluid discharge member to promote better rotation under different conditions and to make the sprinkler stall-proof even when turning comparatively slow, or when operating in a high wind, or on hillsides or slopes.

Another object of our invention is to provide a sprinkler of the character described in which the vibrating means is incorporated in a discharge nozzle having a primary and a secondary discharge jet, the primary jet serving to discharge a main stream which is preferably variable and the secondary jet discharging an auxiliary stream which impinges against a vibrating wheel and sets up vibration which promotes free rotation of the discharge member, this secondary jet also serving to provide a fine spray close to the center of rotation.

We have also aimed to provide an improved nozzle structure of the character described providing quick and easy means for adjusting the angle of the main discharge stream for changing the speed of rotation, and improved means for varying the character of the main stream, whereby to distribute the fluid evenly over a desired area.

A further object of our invention is to provide an improved sprinkler of the reaction-sprayer type which is economical in its cost of manufacture, durable in operation, and efficient for the purpose intended.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description and considered in connection with the accompanying drawing, in which—

Figure 1 is a side elevation, partly in vertical section of a sprinkler embodying our invention;

Fig. 2 is an enlarged side elevation of the nozzle proper with the vibrator wheel in vertical section;

Figs. 3 and 4 are sections taken substantially on the lines 3—3 and 4—4, respectively, of Fig. 2, and

Fig. 5 is a section taken on the line 5—5 of Fig. 3.

In the drawing, we have illustrated our invention as applied to a sprinkler adapted for general purpose lawn sprinkling, but it may be ap-

plied in larger sizes and with different types of supports more suitable for larger areas, as, for example, for golf courses and irrigation purposes.

In the present illustration the discharge tube, designated generally by 6, is mounted for rotation about an upright support 7 in the form of a fluid delivery pipe in turn fixed to a suitable base 8. The pipe 7 connects at its lower end to a suitable fluid supply coupling part 9. In this form, the means for mounting the discharge tube 6 for rotation about the support 7 includes a housing 11 provided with lower and upper bearings 12 and 13, respectively, on the member 7, the bearing 13 being threadedly adjustable in the housing 11 and having end thrust bearing against a suitable packing material 14. The pressure of the discharging fluid tends to lift the housing 11 so that the rotating bearing member 13 has bearing thrust against the packing 14, thereby preventing loss of fluid at this point.

Since rotation of the discharge tube 6 is effected by reaction of the stream at the discharge end, there is a distinct problem in maintaining free and even rotation of the discharge tube under different operating conditions. There is not only the tendency for the bearings to corrode or become clogged with foreign matter, or to stick, but when the reaction nozzle is adjusted to turn slowly, or the sprinkler is set on a slope or hillside, or in the presence of high winds, the rotating discharge tube is apt to stall and thus fail to give even distribution. Our invention provides an improved structure which enables quick and easy adjustments for different conditions of use and provides a simple and efficient means for giving continuous vibration to the rotating discharge tube to keep it in uniform action.

In the preferred embodiment, we have provided a nozzle body, designated generally by 15, having a through passage 16, the intake end 17 of which is threaded onto the outer end of the discharge tube 6. As shown in Fig. 3, the discharge end of the nozzle is offset or inclined with respect to the longitudinal axis of the inlet end so that by rotative adjustment of the nozzle proper with respect to the discharge tube or the support therefor, the stream delivered through the outer or discharge end of the nozzle may be directed at different angles to produce greater or lesser reaction, consequently rotating the discharge tube at different speeds according to the angular adjustment of said stream. A main stream discharged through the outer end of the nozzle is preferably variable as to length and spray characteristics, and for this purpose various means may be employed. In

the present embodiment, the primary discharge jet consists of a jet member 18 mounted for rotation in the outer portion of the nozzle, this jet member having a jet orifice 19 on an axis coinciding with that of the angular end of the nozzle body and the jet member being adjustably rotatable on this axis. A suitable packing and retaining means 21 holds the jet member in position and a knurled cap 22 fixed to the outer end serves as a convenient means for adjusting the jet member. A spring element 23 imposes friction to keep the parts set in adjusted position. The jet member has an angular orifice 24 at its inlet end adapted to register with a port 25 formed by a transverse restriction in the nozzle passage. By rotating the jet member, the volume, as well as angular velocity of fluid delivered through the passage in the main discharge jet, are varied, thereby producing a main discharge stream having different spray effects varying from a fine fan-like spray to a full stream delivery.

The nozzle body is provided with a secondary jet 26 designed to deliver a continuous auxiliary stream for impingement against the periphery of an eccentric mounted for rotation on the nozzle body, the rapid rotation of this eccentric setting up a vibration of the discharge member on its bearing for the purpose above described, and the auxiliary stream being broken into a fine spray which is distributed in the area immediately about the sprinkler. In the preferred embodiment of our invention, the eccentric is in the form of a wheel, designated generally by 27 having a fluted or knurled peripheral portion 28 against which the auxiliary stream impinges, and an annular flange 29 at its lower edge for preventing downward deflection of fluid from the auxiliary stream. A bearing sleeve of oilless metal 31 fixed in the wheel has bearing support on a post 32 fixed to the nozzle body on an axis intermediate the discharge end of the primary and secondary jets and positioning the wheel in cooperative relation with the secondary jet. A screw 33 retains the wheel in position on the post. The wheel is provided with a lubricant compartment 34 which communicates at 35 with the bearing metal. A cap 36 threaded onto the top end of the wheel completes the lubricant compartment, and by providing a wick in this compartment lubricant is conveyed to the bearing. By making the bearing sleeve 31 of porous metal impregnated with grease and utilizing a lubricant supply as herein disclosed, the wheel bearing is provided with suitable lubrication over a long period of time. The lubricant compartment is shaped, as shown in Figs. 2 and 4, so as to leave a heavier body of metal 37 at one side of the wheel, thus providing an eccentric or unbalance which produces vibration when the wheel is rapidly rotated.

From the foregoing it will be manifest that we have provided a compact and efficient correlation of parts adapted by quick and easy adjustment to produce a wide variety of spray effects under widely varying conditions. This construction is particularly advantageous because of its economy in cost of manufacture and also because it prevents stalling rotation of the discharge nozzle even when the sprinkler is set to turn slowly or is subject to such conditions as high winds or location on sloping ground. The construction of the vibrating wheel and its mounting is particularly advantageous because of the small auxiliary stream required for rotating the wheel at a high speed, as well as the simple and compact lubricating feature which insures mini-

mum resistance over a long period of time. Furthermore, impingement of the auxiliary stream against the wheel provides a mist-like spray in the area close to the sprinkler. In the use of our invention, it will be understood that the angular delivery from the discharge nozzle produces a reaction effect which tends to cause rotation of the discharge tube, the reaction effect varying according to the angular setting of the discharge nozzle. When the nozzle is set at a slight angle only, so that the reaction effect is slight, this reaction effect will not be sufficient to cause rotation of the discharge tube. This is because the water pressure has a lifting effect against the discharge tube and causes frictional binding in the bearing structure between the base support and the rotatable discharge tube. Stalling of the discharge tube under slight angular setting of the discharge nozzle is overcome by the action of the rotating eccentric. It will be apparent, therefore, that the combined action of the reaction means and the rotary eccentric serves to effect continuous rotation of the discharge tube.

It will be understood that changes may be made in the construction and arrangement of parts within the scope and spirit of the invention as expressed in the appended claims, in which—

We claim:

1. A sprinkler of the reaction-sprayer type comprising a support, a fluid discharge tube, means mounting said tube for rotation on said support about a vertical axis and with the tube on an axis extending radially away from said vertical axis, a nozzle body mounted on the outer end of said discharge tube, said nozzle body having a primary jet arranged for so discharging a main stream that its reaction on the nozzle body will tend to cause rotation thereof with the tube about said vertical axis, said nozzle body having a secondary jet for discharging an auxiliary stream outwardly in substantially the same direction as said main stream, and a rotary eccentric mounted on said nozzle body exteriorly thereof in position to be rotated by impact action of said auxiliary stream, the combined action of the reaction means and the rotary eccentric serving to effect continuous rotation of the discharge tube.

2. A sprinkler as set forth in claim 1, in which the eccentric is in the form of a wheel having a fluted peripheral portion against which the auxiliary stream impinges, and having a flange adjacent to the lower end of the fluted portion for preventing downward deflection of fluid from said auxiliary stream.

3. A sprinkler of the reaction-sprayer type comprising a support, a fluid discharge tube, means mounting said tube for rotation on said support about a vertical axis and with the tube on an axis extending radially away from said vertical axis, a nozzle body mounted on the outer end of said discharge tube and having a through passage, a primary jet on the nozzle at the outlet end of said passage arranged for so discharging a main stream that its reaction on the nozzle body will tend to cause rotation thereof with the tube about said vertical axis, a secondary jet on the nozzle body adjacent to the intake end of said passage for discharging an auxiliary stream outwardly in substantially the same direction as said main stream, a wheel eccentric mounted on the nozzle body exteriorly thereof to rotate about an axis located intermediate the discharge

of said primary and secondary jets, the secondary jet being arranged so that its discharge stream impinges against a peripheral portion of the wheel for rotating it, the combined action of the reaction means and the rotary wheel eccentric serving to effect continuous rotation of the discharge tube.

4. A sprinkler of the reaction-sprayer type comprising a support having a vertical fluid delivery pipe, a fluid discharge tube supplied by fluid from said vertical pipe and mounted so as to extend radially therefrom for rotation about the axis thereof, a discharge nozzle body on the outer end of said discharge tube, means on the outer end of said nozzle body for delivering a main stream and for varying the delivery of said stream to change the spray characteristics thereof, said means being arranged so that the reaction effect of the main stream will tend to cause rotation of the discharge tube about said axis, means for effecting adjustment of said main stream to change the reaction effect thereof for varying the speed of rotation of the discharge tube, said nozzle body having a jet for delivering an auxiliary stream outwardly in substantially the same direction as the main stream and at a point spaced inwardly from the discharge point of said main stream, and a rotary vibrating member mounted on the nozzle body exteriorly thereof in position to be rotated by impingement of the auxiliary stream, the combined action of the reaction means and the rotary vibrating member serving to effect continuous rotation of the discharge tube.

5. A sprinkler as set forth in claim 4, in which said main stream is delivered through a jet member rotatable in the nozzle body about the longitudinal axis of its jet orifice, the jet orifice extending lengthwise through the jet member, the nozzle body having an interior restriction at the point of fluid passage to the inner end of the jet orifice, said restriction and inlet end of the jet orifice being constructed for varying the character of the fluid delivery into the jet orifice upon rotative adjustment of the jet member, and the secondary jet being arranged to deliver a continuous stream from the supply side of said restriction.

6. In a sprinkler of the reaction-sprayer type, a support, fluid discharge means mounted for rotation on said support about an upright axis and arranged so that the reaction effect of the discharged fluid tends to cause said rotation, and means actuated by discharge of fluid from said discharge means for vibrating said discharge means on its bearing support including a wheel member the periphery of which is shaped to receive said discharge for imparting rapid rotation to the wheel, a bearing upon which the wheel rotates, said bearing being of porous material, said wheel being shaped to provide a lubricant chamber and leaving greater weight at one side of the wheel to effect an eccentric or unbalanced condition, said lubricant chamber being closed and having communication with said bearing, the combined action of the reaction means and the rotary vibrating wheel serving to effect continuous rotation of the discharge means.

7. A sprinkler as set forth in claim 6, in which the discharge means is equipped with a fixed bearing post and said bearing is mounted on said

post and retained thereon by a screw member threaded into the outer end of the post, and said lubricant chamber is closed at its outer end by a cap member threaded onto the outer end of the wheel.

8. A sprinkler of the reaction-sprayer type having a fluid discharge member mounted for rotation about an upright axis, the fluid discharge of said member having a reaction effect tending to cause rotation of said member, a wheel member having a fluted periphery and an eccentric portion, and means mounting said wheel for rotation about a fixed axis on the discharge member, said discharge member having a jet for delivering a stream against the peripheral portion of the wheel for rotating it, the discharge member having a projecting bearing post equipped with an oilless bearing metal sleeve and the wheel member having an internal bearing on said sleeve, the wheel member having an internal lubricant containing compartment communicating with said bearing, the combined action of the reaction means and the wheel serving to effect continuous rotation of the discharge member.

9. A sprinkler of the reaction-sprayer type having, in combination, a discharge tube extending radially away, from, and mounted for rotation about, a vertical axis, a primary jet on the outer end of said tube for so discharging a main stream that the reaction effect of said stream tends to cause rotation of said discharge tube about said axis, a rotary eccentric mounted on said discharge tube exteriorly thereof adjacent to said primary jet adapted for vibrating said tube on its mounting, and a secondary jet on said discharge tube adjacent to the outer end thereof arranged for exteriorly discharging an auxiliary stream in substantially the same direction as said main stream and against said eccentric so that the impact of the stream rotates the eccentric, the combined action of the reaction means and the rotary eccentric serving to effect continuous rotation of the discharge tube.

10. A sprinkler of the reaction-sprayer type having, in combination, a vertical fluid supply pipe serving as a support, a discharge tube mounted for rotation upon and about said support and extending radially away from said support so that the outer end of the tube describes a circle about the support when rotated, said tube having at its outer end a primary jet for discharging a main stream outwardly and at an angle with respect to a radius of said circle whereby the reaction effect of said stream tends to cause rotation of said tube, a wheel type eccentric mounted exteriorly upon and adjacent to the outer end of said discharge tube, and a secondary jet on the outer end of said discharge tube arranged to discharge a stream outwardly in substantially the same direction as said main stream and against the periphery of said wheel so that the impact of the stream rotates the wheel and the wheel serves to break up and distribute the secondary stream in an area inside of that covered by the main stream, the combined action of the reaction means and the wheel type eccentric serving to effect continuous rotation of the discharge tube.

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